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In discussing mind, in the last part of the book, the Spencerian view of the proximate constituents as feelings and relations between feelings is the one accepted. Spencer's classification of cognitions is given and criticized at some length, and then follows a discussion of feeling and a classification of the feelings according to the author, which last comprises almost a quarter of the book. The principle of evolutionary differentiation on which the classification is based certainly commends itself, but whatever may be the value of the discussion, it does not seem to belong to the book, and is a far too special study to interest those who will be interested in the other parts.

As an expression of an earnest wish of a large number of alienists to place the study of mental disease on a better footing, the book is satisfactory, for the evident desire to go straight to the point, and the clear, untechnical character of the style, cannot fail to make it useful to those who have the slightest interest in such matters.

Ueber die Verrichtungen des Grosshirns. GOLTZ. Sechste Abhandlung. Pflüger's Archiv, Bd. 42, Heft 9 und 10.

It is now some four years since the fifth contribution of Goltz made its appearance in this same Archiv. Since that time there have been several papers from the Strassburg laboratory along this line. The present paper is subdivided under three general heads: First, the removal of an entire half of the cerebrum; second, the removal of large symmetrical portions in the frontal half of the cerebrum; third, removal of both occipital lobes. Under the first head, Goltz describes a dog which had lost one cerebral hemisphere, basal ganglia included. The animal with this extensive defect lived some fifteen months after the last operation. His condition is described as that of impaired sensibility and motility on the side opposite the lesion, but there was no complete loss of sensibility or paralysis to be anywhere observed. The animal has become a simpleton that never romps, shows no fear, is somewhat deaf, and hemiamblyopic in its single eye (the eye on the side of the operation having been removed).

The simple fact that a dog can survive such a lesion is in itself a matter of interest. Goltz uses this case at the same time to support several lines of argument. In the first place, it has been often objected that his method of operating left parts of the various cortical centres which he claimed to have removed, and that this fact accounted for the retention of the functions which Goltz described. When an entire hemisphere is removed, this argument is answered, and yet the reactions of the dog were the same as in the cases where the objection had been urged. It has further been held by some investigators that the functions normally resident in the cortex passed, on removal of the cortex, to the basal ganglia. In this case there were no basal ganglia, so that some other explanation of the persistence of function is required.

The author then passes on to say that he has always believed in a very rough localization, at least to the extent that there was a difference between the function of the anterior and posterior portions of the forebrain. Whether the functions of the anterior portion of one hemisphere are represented by the corresponding centres of the other side he proposes to test by the removal of these portions on both sides. This brings him to the second head.

If on one side, the frontal lobe be removed from a dog, the disturbance is not severe. It further makes no difference whether the removal is on the right or the left side. If both frontal lobes be removed, the resulting disturbance is far more than a summation of the effects following the removal of the respective lobes in two different animals. The animal so operated upon cannot eat unaided, is unable to use his paws as hands, can walk but in a very clumsy style, and altogether has his capabilities very much reduced.

If, however, the part of the other hemisphere which is removed is not symmetrically placed, but lies in the occipital region, then the result is an animal in which the motor disturbances are not more marked than they were before the second operation. This indicates that the symmetrically placed portions of the frontal lobes have some power of substituting one another. Further than this Goltz refuses to go. A more detailed relation of the parts which substitute one another he cannot find.

In this connection he describes the case of a dog which had the most extensive lesion that he ever saw. In this animal, almost all one hemisphere and the frontal lobe in the other hemisphere had been removed, so that it was only supplied with the occipital portion of the cortex on one side. This dog died two and a half months after the last operation. During life he exhibited very well the symptom of ceaseless activity so characteristic of dogs operated frontally. According to Goltz, he represented a drinking and eating automaton.

In these cases, sensation was slightly reduced, but there was no part of the body without sensation. Despite the possession of the occipital cortex on one side, the dog last mentioned is described as blind, showing that the connections of this region were somewhere severed.

The third heading is on the removal of the occipital lobes. Besides supporting his old view that the removal of the occipital cortex does not necessarily cause blindness, he wishes to show, as against Munk, that it does cause a disturbance of other sensations. Goltz's argument in the case in hand is, that if the removal of the occipital lobes has for its sole effect the production of blindness, then a dog which has lost his occipital lobes should not differ materially from one which had been simply deprived of his eyes. To this end he removed the eyes from two dogs and kept them both under observation for some time; then, selecting the one which appeared the more intelligent, he removed from this animal both occipital lobes.

According to the views of Munk, this further operation was calculated to produce no essential change in the dog already blind. Goltz finds, on the contrary, very distinct changes. They are summarized as follows: The dog which has lost only his eyes avoids obstacles in a room where he is acquainted with the fittings, comes straight to a person when called, easily finds and follows food when it is moved away, is afraid of threatening sounds, will not eat dog's flesh, goes down the steps of a ladder without falling, jumps out of a small pen that comes up to its breast, is distracted by a jet of air blown on the leg, and can walk on a bridge of slats without falling through. The reverse of all these statements is true for the dog which has lost his occipital lobes as well. On the basis of these results he concludes that the view of Munk is incorrect. The paper is full of points of interest which are here passed over. The view of the

entire question of localization is narrow, and Goltz fails to reckon with many groups of facts. For example, while claiming that his view of the structure of the forebrain offers the fullest support to surgical interference with that organ, he is silent as to the means by which the surgeon can localize the tumor which he is about to remove. At the same time, the accounts in the paper are vivid, and we have for the first time a picture of the bearing of dogs with lesions of such extent. The plate contains a photographic reproduction of the four brains discussed, but in all cases the terms right and left in the text are reversed in the plate, the figures being apparently the mirror-pictures of those described.

La concentrazione del sangue come condizione di stimolo del sistema nervoso centrale. J. NOVI. *Lo Sperimentale*, Heft 5, 1887.

Taking his departure from the fact that when the quantity of sodium chloride in the organism undergoes a marked increase, then muscular twitchings followed by clonic and tonic contractions occur, the author presents the results of experiments made on dogs with a view to explaining this fact. The principal results are as follows:

1. When a 10 per cent solution of sodium chloride is injected into the veins it causes cramps in all the muscles so soon as the percentage in the blood has become about twice the normal.

2. Sodium chloride, under these conditions, does not change haemoglobin into methaemoglobin, and therefore acts differently from the alkaline chlorides investigated by Marchand. The blood taken from the animal during the experiment was dark, but on exposure to the air, became light red, and furnished a colorless serum.

3. The cause of the cramps cannot be a direct action of the sodium chloride on the muscles, because a previous injection of curare prevents the contractions, while a subsequent injection of it causes the contractions to cease after they have begun.

4. The action is not one on the peripheral nerves, because when one circulates blood with double the normal quantity of sodium chloride in a sound limb, the contractions do not occur. If when the contractions are most violent, the nerves supplying a limb are cut, they instantly cease. In a dog that had died from the effects of sodium chloride, the peripheral nerves and muscles were still very excitable, while the substance of the brain was not so.

5. The seat of the reaction is in the brain, and there only, so that dogs deeply narcotized with chloroform may be killed by the injection of the sodium chloride without showing any contractions.

6. The loss of water from the brain is the cause of the contractions. The examination of the gray substance of two normal brains, as compared with two from animals which had been treated with sodium chloride, showed from 5 to 6 per cent less water in the latter.

7. The same explanation is probably true for the cramps caused by an analogous but pathological concentration of the blood—those of cholera, for example.

Ueber die Windungen des menschlichen Gehirns. II. Ueber die Entstehung der Grosshirnwindungen. A. RICHTER. *Virchow's Archiv*, CVIII, 3, S. 398.

In the first part of this investigation the author sought to explain certain abnormal developments in the case of idiots, such as mikro-